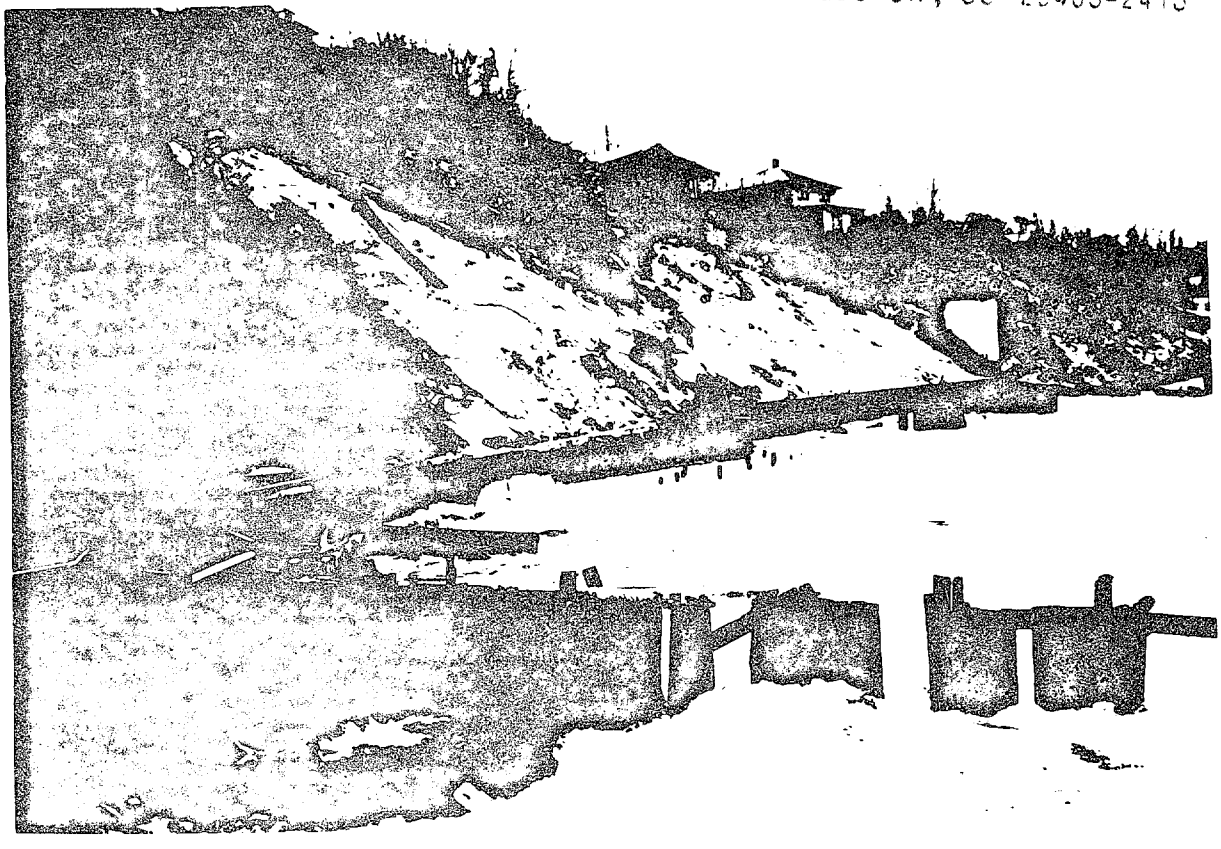
A STRATEGY FOR GREAT LAKES SHORELAND DAMAGE REDUCTION



by

The Joint FRC - GLBC TASK FORCE

for

GREAT LAKES SHORELANDS DAMAGE REDUCTION

March 1974

EXECUTIVE OFFICE OF THE PRESIDENT

OFFICE OF MANAGEMENT AND BUDGET

WASHINGTON, D.C. 20503

JUL 19 1974

Governor Norman A. Erbe
Chairman
Federal Regional Council - Region V
300 S. Wacker Drive - 17th Floor
Chicago, Illinois 60606

Dear Norm:

On March 20, 1974, you transmitted the Region V FRC - Great Lakes Basin Commission Task Force Report entitled, "A Strategy for Great Lakes Shoreland Damage Reduction," for Washington-level agency review and comment. With the concurrence of the Under Secretaries Working Group, I requested the U.S. Water Resources Council to coordinate the review and consolidate agency comments on the strategy statement. The Water Resources Council has completed the assignment and the agency comments and recommendations are enclosed herewith.

We concur with the comments and recommendations, except for the suggestion that the Great Lakes Basin Commission be assigned major responsibility for revising, updating and carrying out the strategy. Given the institutional membership and planning responsibilities of the Great Lakes Basin Commission, it is essential that it be actively involved in the revision and updating of the strategy. However, following from the assignment of responsibilities in Executive Order 11731 and recent policy guidance from the Under Secretaries Group, we expect the Federal Regional Councils to provide leadership in the coordination of operating programs and intergovernmental implementation activities. The interdependence of strategy development and effective program implementation imposes a requirement for continued close cooperation between the FRC and the Great Lakes Basin Commission. We expect that appropriate action will be taken to ensure that such cooperation is maintained.

I wish to emphasize our agreement with specific policy recommendations formulated in the agency review, to wit:

1. The strategy be premised on the utilization of existing statutory authorities;

2. No substantial budget increases should be anticipated;

3. Within any given State, responsibility for coordination and program leadership should, to the extent feasible, be vested with the State Government.

Both the FRC and the Great Lakes Basin Commission are to be commended for their efforts in attempting to develop an integrated response to the shoreland damage problem along the Great Lakes. I wish you success in this endeavor.

Sincerely,

Frederic V. Malek
Deputy Director

Enclosures

FEDERAL REGIONAL COUNCIL
REGION 5
Room 1702 – 300 S. Wacker Drive
Chicago, Illinois 60606

Telephone: 312-353-4000

AUG 5 - 1974

Mr. Frederic V. Malek
Deputy Director
Office of Management and Budget
Washington, D. C. 20503

Dear Mr. Malek:

I am pleased to have received your letter of July 19, 1974, concurring in the desirability of pursuing an overall strategy for Great Lakes shoreland damage reduction. There is intense regional interest in the problem and it provides us an excellent opportunity to work together with the Great Lakes States and the Basin Commission on implementing Federal, State and local programs. Our next step is to intensify the planning to further define the strategy actions within your guidelines.

The Federal Regional Council will look to achieve the necessary coordination with the Basin Commission and the Great Lakes States thru continuation of the Joint Task Force. The States will take the initiative in developing the integrated response to the shoreland damage problem within their jurisdiction with the cooperation and assistance of the Federal agencies. This direction will be achieved through the State Commissioners on the Basin Commission. If additional coordination is necessary from the State, it is anticipated that the State Commissioner would move to achieve it.

We intend to place major emphasis on program coordination. The driving force of the strategy is to develop programs within the present Federal, State budgetary framework to achieve greater public benefits. We intend to review all our program opportunities and redirect to the extent possible.

The strategy is premised on utilization of existing statutory authorities. I plan to have a meeting of concerned Federal agencies to review, in detail, their on-going programs and discuss problems and policy implications.

The Federal Regional Council appreciates your prompt and positive response to the strategy concept and the work of the Water Resources Council and their Federal agency representatives. The efforts of Tom Hadd in coordinating the review process are sincerely appreciated.

Very truly yours,

N. A. Erbe
Chairman
Federal Regional Council
Region V

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INTRODUCTION

This report has been prepared to serve as a focal point for consideration of the development and implementation of a Strategy for Great Lakes Shoreland Damage Reduction by the Governors of the Great Lakes States. Emphasis is directed at identifying an early and sustained action strategy which can be supported by all levels of government. The strategy emphasizes proper land use planning on the one hand and the need to stabilize certain reaches of the shoreland on the other.

To date, the planning effort has been a problem-oriented one instigated by the Federal Regional Council (FRC) and the Great Lakes Basin Commission (GLBC) in an endeavor to make Federal programs more responsive to regional needs.

A formal Joint FRC-GLBC Task Force has been formed in the interest of developing a framework for better communication and closer cooperation among Federal and State authorities. Several meetings and planning workshops have been held since early 1973 in order to generate information necessary for decision-making.

The data given in this report are preliminary and of reconaissance detail. Future more detailed studies and analysis of shoreland resources and values may provide different statements regarding the evaluated factors. The analysis of state and Federal programs is based on available information.

Some basic planning ground rules for the Great Lakes shoreland have been identified. Alternative damage reduction measures have been described and evaluated. Authorities and responsibilities have been outlined. Information and data requirements for successful implementation have been laid out.

It is now time to intensify the planning effort in the direction of program implementation..

SUMMARY AND CONCLUSIONS

THE PROBLEM

- *Shore erosion and flooding are major water resource problems on the Great Lakes. Recurring high lake levels have submerged the beaches that normally protect highly erodible bluffs and dunes supporting a mix of residential, commercial, and industrial development along the 3680 miles of the United States mainland shores along the five Great Lakes. In addition, there are serious flooding problems along the connecting waterways, the confluence of rivers, and low plain areas of the Great Lakes.*

- *Severe property damages have been recorded on the Great Lakes in the early 1973 spring storms. The State of Michigan reports $40 million damages in three storms with significant damages occurring to public property. Numerous public facilities including highways, local roads, water supply facilities, and sanitary waste treatment facilities are endangered.*

THE ALTERNATIVES FOR ACTION

At least seven alternatives are available to reduce erosion and flooding, structural damage, and resulting losses and hardship.

- *Lake Level Regulation to Reduce High Levels*
- *Structural Protection (Temporary and Permanent)*
- *Regulatory Actions to Control Construction in Navigable Waters*
- *Remedial Measures to Modify Improperly Designed Navigation Works and Repair Damages*
- *Zoning and Structural Setback Requirements*
- *Acquisition and Relocation of Development from Vulnerable Shorelands*
- *Insurance Against or Reimbursement from Other Sources for Damage from Erosion and Flooding*

SELECTION CRITERIA

Initial planning efforts to date have identified the following planning "knowns" relative to the criteria against which the various alternatives, or combinations of alternatives, can be evaluated.

- *Shoreland integrity and uniqueness should be protected and preserved by minimizing the impact of development.*
- *Future losses should be controlled primarily by non-structural means.*
- *Extensive government financed structural control measures cannot be justified economically especially for the short term. Protection of essential public facilities and public lands is important now.*

- *Major structural control is needed to protect shoreland resources, to reduce economic losses to private development and to enhance Great Lakes water quality.*

- *Extensive public funding support is not available for protection of privately owned property.*

A STRATEGY FOR REDUCING SHORELAND DAMAGES

Preliminary evaluation of the seven alternatives by participating Federal agencies and the Great Lakes Basin states has led to the formulation of a Strategy for Reducing Shoreland Damages. The Strategy, divided into early action and sustained action phases, is summarized below.

ACTIVITIES		
Planning	**Engineering**	**Land Use Controls**
Early Action Phase		
• A conference of Governors & senior Federal officials to consider the concept for strategy development & implementation • Workshops & review meetings to amplify & refine strategy with attention to: - alternative courses of action - roles of Federal, state & local governments - requirements for additional knowledge & data - priorities & resources • Initial inventory of data availability and development of a data storage and retrieval system. • Efforts to obtain authority at each level of government consistent with roles agreed upon in strategy development	• Continuation of extraordinary lake regulation procedures • Completion of emergency flood protection actions • Accelerated execution of authorized protection projects • Pilot projects using dredge spoil for shoreland protection • Further protective measures by state & local governments with Federal support • Expanded self-protection by private landowners with technical assistance from Federal, state & local governments • Initial inventory of shoreland damages and assessment of protective measures.	• Increase efforts in identification and mapping of flood hazard areas and flood-risk zones • Expansion of disaster insurance coverage under the Flood Disaster Protection Act of 1973 • Development of generalized criteria and standards applicable to shoreland controls • Development of general criteria and standards for regulating construction in navigable waters • Identification of shoreland areas which should be protected through Federal, State or local programs for acquisition and relocation
SUSTAINED ACTION PHASE		
• Continued updating of strategy, based on results of comprehensive analyses of technical, economic, environmental & social factors • Expanding base of technical knowledge & data for use by decision-makers	• Completion of international studies on further lake regulation with decision by U.S. & Canada as to construction • Study, recommendation, authorization & execution of permanent shoreland protection works • Mitigation of damages from navigation works • Continued provision of protection by private owners with technical assistance from Federal, state & local governments	• Enactment & execution of state programs for shoreland management, with Federal assistance under CZM Act • Enactment & execution of state & local programs for acquisition & relocation • Regulation of construction in navigable waters which aggravate erosion & flooding

COORDINATION AND IMPLEMENTATION OF THE EARLY AND SUSTAINED ACTION PROGRAMS

The FRC-GLBC Shoreland Damage Reduction Task Force has been designed to coordinate the implementation work effort. A five-year action program to develop and demonstrate alternative methods of reducing shoreland damages on the Great Lakes is being formulated. These action programs have been scheduled to address immediate and short-term problems and to lay the groundwork for developing an effective approach for dealing with the total problem in the sustained action program.

THE PROBLEM

The Character of the Great Lakes and Its Shoreland

The United States portion of the Great Lakes Basin (see Fig. 1) is located within the highly industrialized North Central Region. It includes the land and water area of 183 counties in eight states. The total area of the Basin within the United States is 174,000 sq mi of which 113,000 sq mi is land area and 61,000 sq mi is water area including lake surface. The total population of the Basin is about 29 million (1970). The Basin has about four percent of the United States land area and 14 percent of the nation's population. The dominant physical feature of the Basin is the Great Lakes and their extensive shorelines. There are approximately 3,680 mi of mainland shoreline in the United States. In addition, there are 250 mi in the United States of shoreline along portions of the Great Lakes connecting channels. These include the St. Mary's River, the St. Clair River, Lake St. Clair and Detroit river system and the Niagara River.

Table 1 describes the physical characteristics use, ownership, and extent of erosion and flooding damages for a base year of 1970. An analysis of these data suggests the following conclusions. For the total shoreline, about 33 percent is residential, 50 percent is agriculture, forest and undeveloped, 10 percent is recreation (public), and 7 percent commercial-industrial and public buildings. Only 17 percent of the Great Lakes shoreline is publicly owned; the rest is private. A third of the Great Lakes Shoreline is subject to significant erosion. Over the last 125 years the average annual rate of loss in many locations has been from 1 to 5 feet. Some shoreline reaches and beaches are stable or accreting. These areas are typically located updrift from natural or artificial barriers to littoral drift.

The Lakes are used intensely by the large concentrations of people living in both the Canadian and the United States portions of the Region. Economic activity depends heavily on the use of the Lake system for commercial navigation and the generation of hydroelectric and thermal power. Many people live on the lakeshore, and many more depend on the Lakes for recreation, as well as for domestic water supply.

Human values of the shoreline are more concentrated in some areas than in others. A most significant aspect of shoreline use is the amount of shore classified as recreational, residential, commercial and industrial (urban serving). For example, in the lower part of Lake Michigan (Planning Subarea 2.2 and 2.3, shown in Fig. 1), 86 percent of the shoreline is in these shoreline classifications. Similar percentages exist in the vicinity of Detroit (Planning Subarea 4.1) and on the shoreline of Lake Erie. Even in the relatively uninhabited shores of Lake Superior, 30 percent of the shoreline is dedicated to urban serving uses. During the last 20 years, forestry and agricultural uses of shoreline lands have declined in face of the demands of the urban population. A long-run projection of this trend would demonstrate most of the Great Lakes shoreline in urban serving uses by 2020.

The physical characteristics of the United States shore of the Great Lakes are the results of development of the Great Lakes Region since the recession of the ice sheet. They range from high bluffs of clay and shale and rock, through lower rocky shores and sandy beaches, to low,marshy clay flats. Except where bedrock is exposed or protective works have been constructed, the glacial overburden comprising the shores of the Great Lakes is still highly erodible.

Table 1

The Great Lakes Shoreline, Condition, Ownership, and Use, 1970

The Great Lakes Shoreline	Miles								
	Total	Minnesota	Wisconsin	Illinois	Indiana	Michigan	Ohio	Pennsylvania	New York
1. Physical characteristics									
With a beach zone	2,107.3	13.1	298.6	38.8	20.4	1,257.6	138.0	48.3	292.5
Without a beach zone	1,572.1	193.1	320.4	26.2	24.6	812.7	127.1	0	68.0
2. Use									
Residential	1,216.0	79.6	173.6	15.0	5.5	653.0	116.4	21.2	151.7
Commercial and industrial	188.6	11.8	33.4	10.5	21.8	53.9	23.8	3.6	29.8
Agricultural and undeveloped	633.5	11.0	140.5	0.6	0.1	290.3	44.8	11.9	134.3
Forest	1,159.4	69.7	183.9	0	0	900.9	4.9	0	0
Recreation (public)	364.6	28.6	58.5	30.9	17.0	131.3	48.6	11.6	38.1
Public building and related lands	60.3	4.3	10.9	8.0	0.6	13.6	16.3	0	6.6
Fish and wildlife wetlands	57.0	1.2	18.2	0	0	27.3	10.3	0	0
3. Ownership									
Federal	133.4	20.1	56.6	3.1	9.3	38.2	6.1	0	0
Non-Federal public	516.9	35.8	111.3	35.8	8.7	226.5	42.5	11.6	44.7
Private	3,029.1	150.3	451.1	26.1	27.0	1,805.6	216.5	36.7	315.8
4. Problem identification									
Noneroding	1,703.8	179.9	191.4	0	0	1,203.4	22.5	0	106.6
Significant erosion									
Critical	214.8	1.0	38.9	10.5	13.0	103.6	25.0	6.0	16.8
Noncritical	1,045.0	14.3	250.6	0	9.6	479.4	75.5	36.0	179.6
Subject to flooding	335.4	4.1	86.5	0	0	204.8	20.9	0	19.1
Protected	380.4	6.9	51.6	54.5	22.4	79.1	121.2	6.3	38.4
5. Total shoreline mileage	3,679.4	206.2	619.0	65.0	45.0	2,070.3	265.1	48.3	360.5

Notes: 1. Tabulation includes Duluth-Superior Harbor and Sandusky Bay.

2. Exclusions: St. Marys River and connecting waters (88.6 miles), Detroit River (31 miles), St. Clair River (38 miles), Niagara River (39.3 miles), Sturgeon Bay and Lake Michigan Ship Canal (19.8 miles), Portage Lake and connecting waterways (98.2 miles), and all island shoreline.

Source: Great Lakes Region Inventory Report, National Shoreline Study. The information presented in this table is preliminary; a more complete study and analysis of shoreland resources and values may provide different results of the evaluated factors.

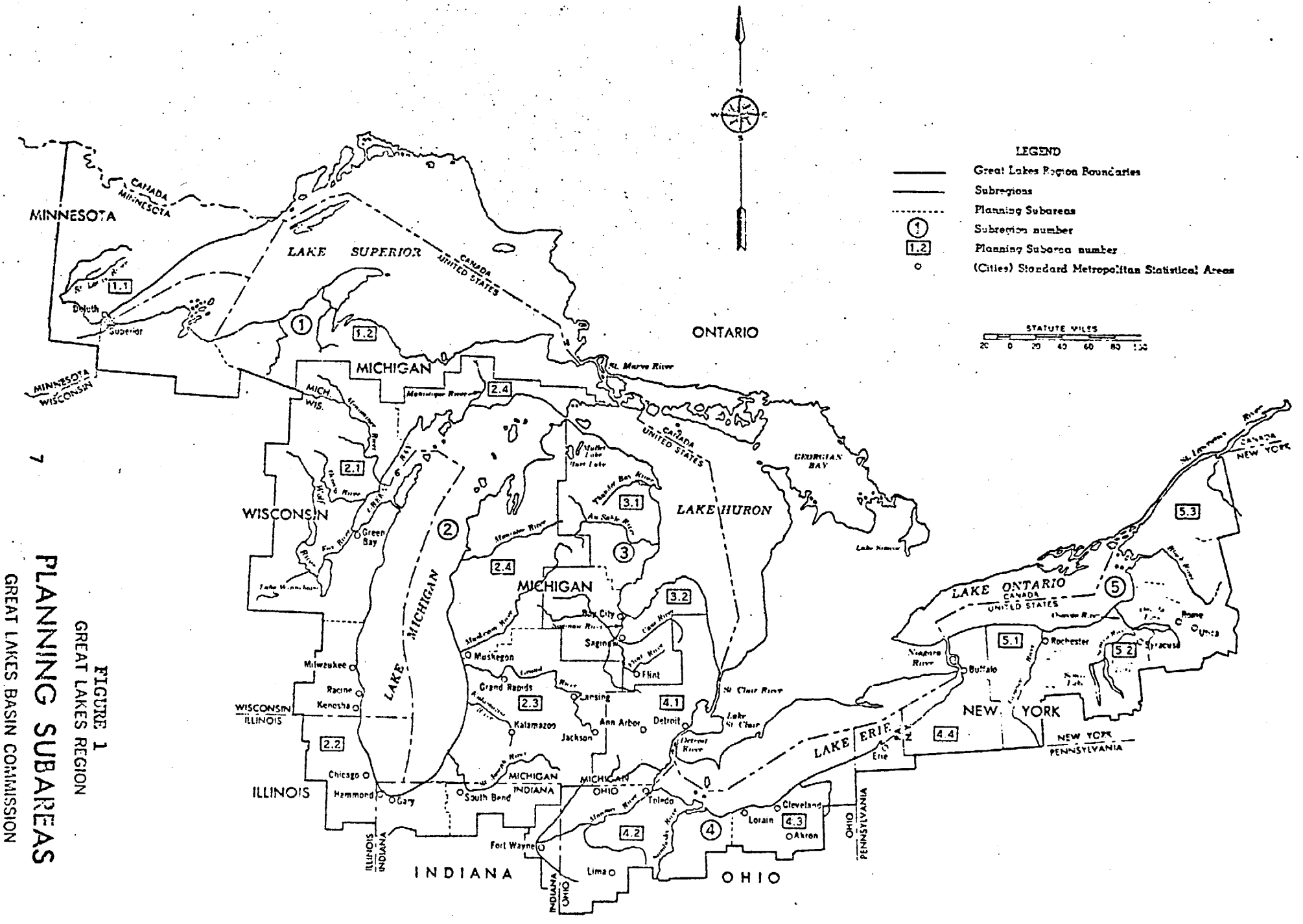

FIGURE 1
GREAT LAKES REGION

PLANNING SUBAREAS

GREAT LAKES BASIN COMMISSION

Shoreland Erosion and Flooding

Shore erosion and flooding are major water resource problems on the Great Lakes.

The resistance of the coastline to water dynamics depends upon the material of which the shorefront is composed. Of progressively diminishing resistance in their ability to withstand wave forces are the rocky coasts of Minnesota, to the sandy beaches of Indiana, to the silty-clay bluffs of Ohio. Damages from erosion and flooding are increased by:

- high lake levels, and Regulation of Lake Levels
- development on vulnerable shorelines, and
- improperly designed protective measures and navigation works

These are discussed below.

High lake levels

With the persistent above normal precipitation of 1972-73, the levels and flows of the Great Lakes have risen from the extreme lows of 1964-65 to the extreme high currently being experienced. These high lake levels have changed the effects that waves have on the shore uplands. Raised above the natural beaches, wave forces can work directly on the highly erodible shore upland, resulting in rapid erosion of the land and severe economic losses to shore property owners. Artificial regulation of lake levels can result in benefits to some interests and losses to others.

Development on vulnerable shorelands

Economic losses from erosion and flooding result from man's use of the coastal zone. Damage results from erosion of the shorelands, causing physical loss not only of land areas but also trees and structures such as stairways, docks and docking facilities, and in the extreme, homes and cottages. Roads and highways are eroded away or closed by inundation.

Improperly designed protective measures and navigation works

Many of the navigation structures and protective works on the Great Lakes were constructed at an earlier time when interest in shoreline changes was not as intense as it is today. These structures modify the pattern of littoral drift, with invariable adverse effects on the downdrift side.

Reaches of mainland shore subject to erosion and flooding have been classified as:

1. Areas subject to erosion generally protected,
2. Critical erosion areas not protected,
3. Non-critical erosion areas not protected,
4. Reaches of shore subject to lake flooding, and
5. Reaches of shore not subject to erosion or flooding.

This identification was based primarily on information available from the International Joint Commission Study on Water Levels of the Great Lakes and existing reports. Critical erosion reaches are those shoreline areas where the loss of land, economic losses, and other considerations appear to justify protective measures.

Table 2 summarizes the areas with critical erosion problems.* The states with the greatest number of miles of shoreline with critical erosion problems are Michigan, Wisconsin, and Ohio. The lakes on which the greatest problems are located are Lake Michigan, Lake Erie and Lake Superior. Almost 40% of the total critical shoreline is along Michigan's Lake Michigan shore.

TABLE 2

CRITICAL EROSION PROBLEMS
(Miles)

Lake	Minnesota	Wisconsin	Michigan	Illinois	Indiana	Ohio	Pennsylvania	New York	Total
Lake Superior	1.0	12.9	14.9						28.8
Lake Michigan		26.0	80.7	10.5	13.0				130.2
Lake Huron			8.0						8.0
Lake Erie						25.0	6.0	0.0	31.0
Lake Ontario								16.8	16.8
Total	1.0	38.9	103.6	10.5	13.0	25.0	6.0	16.8	214.8

Damages Due to Shoreland Erosion and Flooding

Erosion and flooding damage is greatly increased during periods of high lake levels. Such periods occurred in the late 1920's, the mid-1940's, and the early 1950's. Record high water levels are currently being recorded. The potential for shore property damage increases many times with each passing high water period. Further development of unprotected shorelands and continually increasing shore property values creates this potential.

Severe property damages were recorded on the Great Lakes in the early 1973 spring storms. The State of Michigan reported $40 million damages in three storms with significant damages occurring to public property. Numerous public facilities including highways, local roads, water supply facilities, and sanitary waste treatment facilities are endangered.

The only dollar estimate of shoreland damages along Michigan's Great Lakes shore is that compiled for the 1951-1952 high water period. In May 1952, field damage surveys were made for all of the Great Lakes shorelands and connecting channels within the United States. The U.S. Army Corps of Engineers supervised the survey with the assistance of local coordinators from the states bordering the lakes. The damage information collected pertained to the period from the spring of 1951 to the spring of 1952. The estimate of total property damage to all shore properties in the U.S. portion of the Great Lakes during this period was $60.3 million based on 1952 dollar values. Of this total, $50 million was associated with erosion damage and $10 million with flooding damage.

If the 1950-1952 water level and storm conditions occurred under current shore property development and values, the resulting damages would be several times that which resulted during the 1951-1952 period.

*Based on Great Lakes Regional Inventory Report, National Shoreline Study, U.S. Army Engineer Division, North Central, August 1971.

SEVEN EROSION AND FLOOD DAMAGE REDUCTION ALTERNATIVES

Future shoreland erosion and flooding damages can be reduced through the use of two basic courses of action — engineering techniques and management techniques. Engineering techniques are designed to influence the physical interface of land and water. Management techniques are intended to influence people in their use and development of the shorelands.

Engineering techniques can be divided into two general categories — structural shore protection measures and lake level regulation. Structural shore protection measures, such as seawalls, breakwaters, beach nourishment, etc, will reduce or preven erosion of lands and corresponding damage to buildings. Use of structural measures maybe very desirable along developed shores in high risk erosion areas. Lake regulations could reduce erosion and structural damage but the environmental and economic implications of regulation can be severe.

Land use controls applicable to shoreland erosion problems are generally limited to acquisition and regulatory controls. These techniques are not intended to reduce future losses of land due to erosion but to reduce or eliminate costly damage to buildings or future structures. Land use control programs are highly desirable for relatively undeveloped shorelands. They are not generally effective for reducing erosion damage along developed shorelands particularly in high-risk erosion areas.

Initial planning to date has resulted in the identification of several alternatives which could be used to reduce erosion and flooding, structural damage, and the resulting losses and hardship. These are:

- Lake Level Regulation to Reduce High Levels
- Structural Protection (Temporary and Permanent)
- Regulatory Actions to Control Construction in Navigable Waters
- Remedial Measures to Modify Improperly Designed Navigation Works and Repair Damages
- Zoning and Structural Setback Requirements
- Acquisition and Relocation of Development from Vulnerable Shorelands
- Insurance Against or Reimbursement from Other Sources for Damage from Erosion and Flooding

The alternatives represent a spectrum of engineering and management techniques as they would apply to a particular problem class - shore land erosion and flooding. Each of these alternatives is examined below in enough depth to bring out the principal capabilities, limitations and external effects which should be considered before employing them.

Although it is necessary to consider each technique individually here, in practice they are usually best employed in conjunction with each other. It might be desireable,for example, to employ an engineering technique to preserve or protect presently highly developed shorelands and to use management techniques to control the long-term development on presently undeveloped shoreland.

ALTERNATIVE #1: Lake Level Regulation to Reduce High Levels

The levels of Lakes Superior and Ontario are currently regulated within the control limits of the existing regulatory works and criteria for regulation and in accordance with Orders of Approval of the International Joint Commission (I.J.C.). levels of Lakes Michigan, Huron and Erie are presently unregulated. Extending the regulation to these lakes presents engineering and economic problems of considerable complexity.

The International Great Lakes Level Board's interim report dated March 15,1973, proposed a new plan for the regulation of Lake Superior. Under the new plan, the outflow would be determined so that Lake Superior and Lakes Michigan and Huron would be kept proportionately the same amount above or below their long-term average levels for the period 1900-1967. It would redistribute the water in the system, produce slightly higher levels in Lake Superior and slightly lower levels in the downstream Lakes, and thereby result in benefits to some interests and detriments to others. The actual and potential damages which have or might occur on shorelands of Lake Superior have not been developed on a basis suitable to determine compensation.

In order to reduce the level of Lake Ontario, the St. Lawrence Board, using its discretionary powers, authorized releases in excess of preproject flow for 12 weeks. For all of June and July 1973, the outflow was 350,000 cfs. This exceeded by 32,000 cfs the maximum recorded flow before the Project was built and by 13,000 the peak flow that would have occurred this summer without the Project. These outflows kept Lake Ontario at least one foot lower at all times than it would have been if the Project had never been built.

The maintenance of constant levels on the Great Lakes is not feasible in the face of the natural variation in the supply of water received as rain and snow and the large surface area and volume of the lakes. Release of large amounts of water over short periods of time would have extremely detrimental effects on the levels of the connecting waterways, such as the St.Clair River and the St.Lawrence River, and downstream lakes such as Lakes Erie and Ontario.

While the maintenance of constant levels is not feasible, a recent study by the I.J.C. indicates that regulation of Lakes Michigan, Huron and Erie could reduce the frequency and duration of the extreme high water occurrences. However, present meteorological forecasting techniques cannot provide precise weather forecasts far enough in advance to allow sufficient time to gradually discharge the potential surplus volume of water without damaging effects. Additional studies on regulation of the lake levels are currently being conducted under the direction of the I.J.C.

The many uses of the Lake system depend critically on the magnitudes of Lake levels and outflows. Commercial navigation depends on maintenance of adequate depths. The hydro-electric power entities need adequate flows to meet electric demands. Shore interests desire to avoid either extreme high levels, which may damage their property, or extreme low levels, which can interfere with recreational uses of the Lakes.

A major issue is the question of compensation to parties who would be damaged as a result of implementation of a lake level regulation plan. The information needed to address this question is not available. Existing lake-level/damage curves are averaged over major shoreland reaches and are inadequate to determine tradeoffs.

In the past it has been deemed best to make only small changes from conditions to which everyone had adapted his activities and to make such changes only when there were significant advantages to be gained and minimal disadvantages to any interest or to any lake. Under this approach, Canada and the United States have sought gradually to optimize their use of the Great Lakes. However, man has not succeeded in regulating the levels and flows of the lakes within a significantly narrower range in the face of the natural variation in the supply of water received as rain and snow.

Assessments by the states of the short and long term effectiveness of lake level regulation are summarized below.

Short Term

Assessment	Minn.	Wisc.	Ill.	Ind.	Mich.	Ohio	Penn.	N.Y.
Do Nothing	●	●		●				
No Goals			●			●	●	
Support Economically Feasible Plans					●			●
Provide Socially Acceptable Regulation Plans								
Maximum Physical For All Purposes								

Long Term

Assessment	Minn.	Wisc.	Ill.	Ind.	Mich.	Ohio	Penn.	N.Y.
Do Nothing		●		●				
Not Certain	●				●	●		●
Provide Economical Regulation Plans			●				●	
Provide Socially Acceptable Plans								
Provide Maximum Physical Regulations								

- *Summary*

  - *There is little potential for reducing the range of lake levels by an amount sufficient to solve the shoreland damage problem on the Great Lakes.*
  - *Lake regulation plans must allow for full consultation among all interested parties. The question of compensation is a major issue. The data base is inadequate to determine tradeoffs. A compensation system should be developed and implemented to the mutual satisfaction of the parties affected by the extraordinary regulation.*
  - *The States goals for additional lake regulation varies. All regulation plans should be economically feasible in terms of the entire basin. The States should share in the selection of such plans.*

ALTERNATIVE #2: Structural Protection Against Erosion and Flooding, both Permanent and Temporary, Including Methods of Reducing Groundwater Effects on Bluffs

Measures designed to stabilize the shore are divided into three general classes:

- physical structures such as bulkheads, seawalls, revetments, groins, and offshore breakwaters which prevent waves from reaching erodible materials, and
- artificial supply of sand (beach nourishment) to the shore to help overcome a devidiency in sand supply through natural processes, and
- other methods which use artificial or enhanced "natural" materials and/or techniques to retain shoreland character such as methods to hold sand in place or to encourage growth of vegetation.

Shore protection is most effective and economical when complete physiographic reaches are considered and proper attention is given to the effects of the protection on adjacent shores and on natural environment. Detailed studies of each site with careful consideration of alternative methods are essential preludes to efficacious results, least cost, and least modification of existing environment. A brief discussion of generally used methods of protection follows.

- Artificial Fill and Nourishment. It is often economical to allow erosion to persist and to restore and subsequently nourish a beach with sand from other sources. This method is especially desirable when sand of suitable characteristics may be obtained from nearby bays, inlets, or inland borrow areas without damage to the ecology of the area. The development of economical methods of dredging sand from deep water offshore and placing it on the beaches may result in reduced costs; however, research is needed.to locate such deposits having the proper grain size distribution and develop new dredging techniques.
- Groins. Groins are structures constructed generally perpendicular to the shoreline, across the beach, and into the water. Used individually or in a series, they interrupt the sand moving into the area and widen the beach at the location. Only when large amounts of sand are in transit is this method effective. The accelerated erosion downdrift which usually results from groins is minimized when sand is artificially added to the system.
- Seawalls. Seawalls are massive rigid structures constructed parallel to the beach line to withstand and reflect wave energy. Seawalls, by preventing erosion of areas that added sand to the supply in motion, may accelerate erosion of the fronting beaches and nearby areas.
- Revetments. Revetments are blankets of non-erodible material placed on a bank, bluff, or escarpment to prevent erosion. Stone or concrete blocks are commonly used. In function, revetments are similar to seawalls except they are more flexible, generally of lighter construction, and less costly, and often they present a sloped face to the waves, rather than the usually vertical face of a seawall. Revetments may accellerate erosion of fronting beaches and nearby areas.
- Breakwaters. Breakwaters for shore protection are usually massive stone structures located in the sea parallel to the shore; they interrupt the wave before it reaches the shore. This interruption of wave action causes a calm landward of the breakwater which slows the alongshore currents and causes sand to impound behind the structure. This impoundment is at the expense of downdrift beaches; there, increased erosion may follow.

- Other Methods. Sand fences are effective protection for beaches and dunes behind the shoreline. The ridges or dunes formed by the fence prevent storm waves from overrunning a low beach, barrier beach, or spit. Vegetation serves a similar purpose in stabilizing dunes or beach areas which are not intensively used for recreation. Vegetation also is effective in reducing erosion of shorelines in bays and estuaries.

Low cost protective measures are described in a brochure entitled "*Help Yourself,*" a Corps of Engineers publication. The brochure is distributed to private shore property owners by the Corps and the Great Lakes States. The State of Michigan expects to develop demonstration projects using low cost shore protection measures. The State of Ohio recommends use of gabions (stone filled wire baskets) as a means of low cost shore protection.

It cannot be over-emphasized that separate protective works for an individual piece of property within an eroding shore reach is difficult, costly, and may prove ineffective. Such protective works often fail at the flanks as the adjacent, unprotected shores continue to erode and recede. Partial or inadequate protective measures may even accelerate erosion of adjacent shores. The most effective econimcal means of protection are achieved through coordinated action under a comprehensive plan which considers the erosion process over the full length of the receding shore.

Among the Federal agencies, the U.S. Army Corps of Engineers has been assigned the major responsibility for shore erosion control. The Corps of Engineers is authorized to research the causes of beach erosion problems, and construct shore protection works. The Corps is also authorized to provide assistance in major disasters and in floods and coastal storms. These programs are summarized below.

a. Permanent Protection

- Projects - Congressional authorization for Corps construction of protection projects, on a case-by-case basis, has essentially established the Federal concern. Current policy for Federal participation in the cost of construction provides for the following:

  Federal property - full cost borne
  State, county or other publicly owned property - up to 70 percent of total development cost subject to constraints on human habitation, permitted uses, environmental impacts, buffer zones, and public uses. Private facilities are excluded.

- Survey Reports - implementation studies for control of flooding or erosion are authorized by Congress.

- Small Beach Erosion Control Projects - conducted under Special Continuing Authority. There are 18 active projects of this type on the Great Lakes at this time.

b. Temporary and Emergency Protection

- Flood Control Act of 1962 (Public Law 99) - flood emergency operations are authorized whenever and whereever required.

- Operation Foresight - accomplished under Public Law 99. aimed at protecting 140 shore areas and 100 miles of shoreline. Federal, state and community authorities are cooperating. Construction of $25 million worth of temporary dikes is essentially accomplished.

- 1946 Flood Control Act, Section 14 - Under this act, the Corps has taken action to provide protection to public utilities on the Great Lakes. Presently, 12 studies are underway, of which 11 are on Lake Michigan and 1 is on Lake Superior. There is a Federal project cost limitation of $50,000 per project.

- Advisory Activities - In addition to serving in a continuing advisory capacity upon request, the Corps has developed a brochure, "Help Yourself." This brochure provided technical information to owners of private shore property for the protection of the shoreline from erosiion damages.

Studies by the Corps of Engineers reveal that progress in shore protection has been slow under the policies and programs presently in effect. Only 22 beach erosion control projects have been authorized by Congress, and less than one half of the authorized projects have been constructed. The Corps of Engineers has no authority and no program to construct erosion control projects aimed soley at protecting private shores. Since 83 percent of the shoreline is in private ownership, little Federal assistance is available to protect shoreline resources.

In all cases, the criteria for implementation of structural protection measures imply that in most cases these measures are applied only to high value, already developed shorelands. The emphasis on structural solutions to solve erosion problems mitigates against sound comprehensive planning for the coastal zone.

The states have sufficient authority to regulate structural solutions, to protect state lands and to provide technical assistance to property owners. Local units of government have the authority to guide the development and use of the shorelands through their programs of zoning, building codes, subdivision regulations, etc.

State assessments of temporary and permanent shoreland protection measures are summarized below.

Temporary Protection for Private Lands Subject to Erosion Damages

Assessment	Minn.	Wisc.	Ill.	Ind.	Mich.	Ohio	Penn.	N.Y.
Do Nothing								
Not Important		●		●			●	●
Provide Where Feasible	●		●		●	●		
Provide Where Needed								
Armor the Shoreline								

Temporary Protection for Public and Private Lands Subject to Flooding

Assessment	Minn.	Wisc.	Ill.	Ind.	Mich.	Ohio	Penn.	N.Y.
Do Nothing								
Not Important	●		●	●			●	
Provide Where Economically Feasible		●			●	●		●
Provide Where Considered Advisable								
Provide Where Possible								

State Programs for Structural Protection Measures

Assessment	Minn.	Wisc.	Ill.	Ind.	Mich.	Ohio	Penn.	N.Y.
No Program								
Regulatory Only	●	●	●	●	●	●	●	●
Protect State Lands		●		●	●	●	●	●
Provide Technical Assistance					●	●	●	
Cost Share in Construction on Private Lands						●		

Permanent Protection for Public Lands Subject to Erosion

Assessment	Minn.	Wisc.	Ill.	Ind.	Mich.	Ohio	Penn.	N.Y.
Do Nothing								
Protect Essential Facilities	●	●	●	●	●	●		●
Protect Public Land Where Economically Feasible		●	●		●	●	●	●
Protect Public Land Where Considered Advisable		●						
Protect Public Land Where Possible								

Summary

- *Little Federal assistance is available to protect privately owned shorelands.*

- *Many States support the provision for permanent protection when feasible, based on economic, social, and environmental criteria.*

- *Temporary protection is important now. Research is needed to develop economical and environmentally acceptable low cost shore protection measures.*

- *Some States provide little or no technical assistance to property because of legal or financial reasons.*

- *The States have sufficient authority to regulate structural solutions.*

- *Highest priority is assigned to protection of essential public facilities. Second priority is public lands.*

ALTERNATIVE #3: Regulatory Action to Modify or Avoid Any Construction in Navigable Waters Which Tends to Aggravate Erosion and Flooding

Dredging or construction of shore protection works by private landowners on other property interests can often aggravate erosion and flooding problems along a reach of shoreline. A landowner has the right to protect his property from erosion; however, the significant probability of damage to others due to changes in the pattern of littoral drift, for example, speaks well for some form of public input.

The regulatory action presently applicable for proposed construction activities in navigable waters takes the form of permit requirements by the appropriate Federal or state agencies. In general, both Federal and state permits are required prior to initiation of dredging and construction of shore protection works along the shores of the Great Lakes, lakeward of the highwater line.

Federal permits are issued by the Corps of Engineers usually only after a state permit has been obtained. Permits for construction activity in navigable waters, including dredging and other construction work, will be reviewed for compliance with the authorities and requirements of the Federal Water Pollution Control Act Amendments of 1972, the Marine Protection Research and Sanctuaries Act of 1972, and the Coastal Zone Management Act of 1972. The lack of coordination of permit programs between the Federal and state agencies has been underscored by parties attempting to obtain dredging and construction permits. This shortcoming also speaks well for the development of a coordinated permit program.

Permit programs are most effective when coordinated with an overall shoreland management plan in order that consistency in application is achieved. The fact that little or no public financial aid is available to owners of private property results in the construction of many stopgap erosion and flooding protective measures which may aggravate the problem. A permit program which is administered as part of an overall Shoreland Damage Reduction Strategy provides an opportunity for technical assistance to the landowner and can provide an opportunity for identifying those situations where a group effort of contiguous property owners can be organized and implemented. The administration of a permit program of this type would require considerably more resources and data than is allotted to existing permit programs.

Assessment of state regulatory authorities and programs, and the states' view of the need for Federal regulatory program changes are summarized below.

State Authority for Regulating Construction to Prevent Aggravation of Flooding and Erosion Damages

Assessment	Minn.	Wisc.	Ill.	Ind.	Mich.	Ohio	Penn.	N.Y.
No Authority*		●	●				●	
Authority Exists but not Enforced	●				●	●		●
Active Program Under Consideration								
Active Program Underway				●				

*No state programs exist to compel landowners to participate in erosion control plans.

Federal Regulatory Program Changes

Assessment	Minn.	Wisc.	Ill.	Ind.	Mich.	Ohio	Penn.	N. Y.
None Needed		●		●			●	●
More Coordination	●		●			●		
Technical Review					●	●		
Control Construction								
Moratorium on Permits								

- *Summary*

  - *Successful incorporation of permit programs into a comprehensive management framework will require additional resources and data.*

  - *The State have authority to control construction along the shoreline lakeward of the high waterline. Most States do not have specific regulations prohibiting structures that aggrevate erosion or flooding damages.*

  - *No State programs exist that compel private shoreland owners to participate in a program to correct erosion or flooding damages.*

  - *Federal and State regulatory programs should be strengthened to include closer coordination, technical review, and effect assessment.*

ALTERNATIVE #4: Remedial Measures to Modify Improperly Designed Navigation Works and Repair Accumulated Damages

Navigation works and their operation and maintenance can have important local effects in creating erosion problems in the Great Lakes area. Harbor structures modify the pattern of littoral drift, with invariable adverse effects on the downdrift side. When viewed in the light of the total length of shoreline, however, the effects may be said to be minor. The major problems in this regard are in Michigan and Ohio.

Section 111 of R&H Act of 1968 (P.L. 90-483) provides authority to the Corps of Engineers to "...investigate, study, and construct projects for the prevention of shore damages attributable to Federal navigation works." Projects whose cost is limited to $1 million or less do not require Congressional approval. The Federal Government bears the entire cost of installing, operating, and maintaining such projects. This authority applies to both public and privately owned shores located along the coastal and Great Lakes shorelines damaged by Federal Navigation projects.

Responsible local and state agencies have requested 29 Section 111 Studies. The studies are in various stages of completion and preliminary studies establish the fact that navigation works did aggravate erosion damages down drift of the structure. No projects under this authority have been constructed in the Great Lakes region.

Assessment of the Section 111 studies by the States are summarized below.

Section 111 Studies - COE Investigations of Navigation Structures and Remedial Construction

Assessment	Minn.	Wisc.	Ill.	Ind.	Mich.	Ohio	Penn.	N.Y.
Not Applicable								
Not Important								●
Minor Importance		●		●				
Important	●		●				●	
Very Important					●	●		

- *Summary*

  - *Navigation works do not contribute greatly to the total damage problem on the Great Lakes. Their effects locally are very important, especially in Michigan and Ohio.*

  - *Michigan and Ohio have established high priorities for correcting shoreland damage resulting from existing navigation works. However, since the existing navigation works causing shoreland damages are the result of Federal programs and projects the States generally do not recognize responsibility to shore in the correction of these problems.*

ALTERNATIVE #5: Zoning and Structural Setback Requirements to Prevent Further Development on Vulnerable Shorelands

Shore objectives can often be satisfied by directly controlling the use of both private and public property. Regulatory devices that do so are founded on the police power of government to protect the health, safety and general welfare. For the police power to be employed, an appropriate legislative body must have found in fact a need for the particular exercise of authority and articulated its terms in legally sufficient detail. The successful implementation of land use controls depends critically on the attitude of the states and local communities on the need for these controls and the priorities the state attaches to the technical studies and educational programs needed to support this alternative.

Local ordinances establish zoning districts and impose restrictions on uses of land, densities, building heights, industrial development and the like. The concept is to control private property uses that may affect the community adversely. The coverage of zoning has been increasing in recent years to require such things as:

- Setbacks from shorelines. These are established survey lines indicating the limits for certain types of development. Setbacks can be based upon a number of technical, administrative and developmental considerations.
- Conservancy districts applicable to wetlands and areas subject to frequent flooding.

The new Coastal Zone Management (CZM) Act of 1972 should provide overall leadership for coastal zone and shoreland management. The recommended scheme for shoreland management consists of an overlapping of discrete sets of responsibilities. Management activities extend from Federal policy making to local implementation efforts, with principal planning and coordinating responsibility resting with the state. This overlapping can be thought of as transfer functions; the gap between Federal policy making and state planning would be bridged by Federal guidelines; between planning and implementation there would be state goals, standards, and regulations.

Implementation of the programs of the Coastal Zone Management Act of 1972,* in which the Great Lakes States are planning to participate, can provide the kind of coordinated approach needed for insuring that future development does not occur on vulnerable shorelands. The Act authorizes the Secretary of Commerce to make annual grants to coastal states for the purpose of assisting in the development of management program for the land and water of its coastal zone. Early funding of the program will be a major factor in a successful and coordinated program for the reduction and prevention of shoreland damages.

*Pertinent sections of the Coastal Zone Management Act are summarized on the following page.

COASTAL ZONE MANAGEMENT ACT OF 1972

Public Law 92-583, Title III, Section 303
Management of the Coastal Zone

"...it is the national policy (a) to preserve, protect,develop, and where possible, to restore or enhance, the resources of the Nation's coastal zone for this and suceeding generations, (b) to encourage and assist the states to exercise effectively their responsibilities in the coastal zone through the development and implementation of management programs to achieve wise use of the land and water resources of the coastal zone giving full consideration to ecological, cultural, historic, and esthetic values as well as to needs for economic development, (c) for all Federal agencies engaged in programs affecting the coastal zone to cooperate and participate with state and local governments and regional agencies in effectuating the purposes to this title, and (d) to encourage the participation of the public, of Federal, state, and local governments and of regional agencies in the development of coastal zone management programs. With respect to implementation of such management programs, it is the national policy to encourage cooperation among the various state and regional agencies including establishment of interstate and regional agreements, cooperative procedures, and joint action particularly regarding environmental problems."

Limitations in zoning as a technique result primarily from its usually local character which severely restricts the possible impact both spatially and temporally. This deficiency could be minimized by keying the zoning to broad master plans and by state assumption of shoreland zoning aspects that have widespread implications. In Michigan the state requires state-level review and approval of local zoning in certain delineated shoreland environmental and erosion-prone areas. A zoning plan can also be made stronger with acquisition of some land use rights at key points on the shore to reduce pressure to alter the zoning pattern. Another limitation on zoning is found in judicial interpretations as to what constitutes a valid exercise of the police power. For example, in many states, zoning for purely aesthetic purposes has been judged not to be legally included by itself in the "general welfare." Aesthetic purposes are frequently upheld, however, if they can be demonstrated to contribute to the health, safety, morals or general welfare. The protection of private property is usually found to be in the general welfare.

Much of the significant high-risk erosion areas in the Great Lakes are in private ownership. In view of the statutory limits governing the regulation of private property, it is essential that regulation be based on a sound technical foundation. Many local governmental units do not have comprehensive plans, planning capability, or the technical expertise to identify high-risk erosion and flooding areas. In particular, data on the long-term erosion potential of the various segments of the shoreline, flood height information such as developed in the Corps of Engineers' Flood Plain Information reports, land use, ownership, and damage information are high-priority planning needs.

Current programs of the Federal Government which can contribute in this regard include the Corps' Flood Plan Management Services (FPMS) program for use by local governmental entities. Their purpose is to develop the technical details required to promote wise use of the flood plain, consistent with the flood risk and damage potential. Flood hazard information reports of lesser detail and scope are prepared as needed.

The present policy on flood plain information reports indicates that beach erosion is within the authority of flood plain management program. Erosion rate information has been developed as part of survey scope studies authorized by Congressional Resolution. Data from a number of previous studies have been developed. Coverage is not complete nor does it take into account the current high water period.

The Coastal Engineering Research Center (CERC), Littoral Environmental Observation (LEO) Program, collects and records data on coastal processes and shoreline erosion. This is a cooperative program with the states and the Federal Government and was established as a pilot program at 11 sites on Lake Michigan in the Fall of 1971. In the Spring of 1972, the program was expanded to include Lakes Superior, Huron, and Erie, with a total of 20 sites. This year, several additional sites were added on Lake Michigan and Lake St. Clair for a total of 25 sites. The program will be extended to Wisconsin, Illinois, and Indiana shoreland areas in the near future.

The state programs in shoreland management recognize that the authority to develop and enforce zoning regulations rests with local government. The states can influence the local jurisdictions in an advisory capacity and through the enforcement of regulations, such as permits for private dredging and filling, or, as is the case in Minnesota, by setting minimum requirements for local land use controls. Expansion of the state role through legislation, which is legally valid, is limited by local community and land owner concerns for home-rule and private property.

Assessment by the States of the importance of zoning and structural setbacks is summarized below.

Importance of Zoning and Structural SetBacks

Assessment	Minn.	Wisc.	Ill.	Ind.	Mich.	Ohio	Penn.	N.Y.
Low								
Moderate			●					
Moderately High								
High							●	
Highest	●	●		●	●	●		●

Who Implements Zoning

Assessment	Minn.	Wisc.	Ill.	Ind.	Mich.	Ohio	Penn.	N.Y.
Local	●	●	●	●	●	●	●	●
State								

State Participation in Coastal Zone Management Program

Assessment	Minn.	Wisc.	Ill.	Ind.	Mich.	Ohio	Penn.	N.Y.
No								
Not Sure								
Maybe				●				
Yes Subject to Consideration								
Yes	●	●	●		●	●	●	●

- *Summary*

  - *This is one of the most promising alternatives and the key to insuring that future development does not occur on vulnerable shorelands. For this reason, these studies should have the highest priority.*

  - *Erosion rate studies should be initiated immediately to fulfill the data requirements needed by the states to establish the coastal zone management program.*

  - *The authority to develop and enforce zoning regulations rests with local government in many instances with guidance from the State. Communities are concerned that decisions about the shorelands will be taken out of their hands.*

  - *The Great Lakes States are planning to participate in the Coastal Zone Management Program. Early funding of the program will be a major factor in a successful and coordinated program to reduce shoreland damages.*

ALTERNATIVE #6: Acquisition and Relocation of Developments from Vulnerable Shorelands

Public acquisition is the most absolute means of control over the development and use of shorelands, whether they be high-risk erosion areas, environmental areas, or other scenic, historic, and recreational areas. Acquisition in fee simple confers complete ownership and usage rights and is, therefore, the most straightforward legally clear method.

The major drawbacks to acquisition and relocation are the high cost of shoreland property and the normally limited funds available for this purpose. Shoreland property prices in Michigan, for example, range from $75 a front foot in remote areas to over $200 a front foot in developed areas. Through the use of other means, such as acquisition of scenic or historic easements, restrictions on development rights, the cost of acquisition can be reduced and land can be left in private ownership and on the tax rolls. Unfortunately, easement and severance changes can often cost almost as much as fee simple — particularly for shore land property.

The authority to acquire shorelands exists and has been used to a significant extent on the Great Lakes. For example, 21 percent of the mainland Great Lakes shoreline in Michigan is in public ownership under either Federal, state or local governmental jurisdictions. Federal Grants-in-Aid programs to purchase lands or secure easements now exist in the Bureau of Outdoor Recreation, the Bureau of Sports Fisheries and Wildlife and the National Park Service. These programs could offer some support in an acquisition program. Urban renewal or redevelopment projects may be another program under which Federal financial assistance may be available.

In most cases the fund allocations for public purchase have been earmarked for beach acquisitions or areas with high recreational or other use potential. Priorities for future acquisition include highly urbanized areas subject to erosion and flooding in which extensive costs would be necessary in order to protect property. In these instances, purchase and subsequent relocation of development may be the most economical and effective approach. The problem is whether acquisition will be necessary or will some kind of shoreland use restrictions of private property be appropriate.

The development of information on the effectiveness of current and proposed management approaches (of which acquisition and relocation is one) such as those growing out of state programs under the Coastal Zone Management Act of 1972, will be a necessary prerequisite for an effective strategy in this regard.

Assessments of the importance and status of acquisition programs in the States, presented below, are informative and provide a basis for formulating action plans.

Importance of Acquisition

Assessment	Minn.	Wisc.	Ill.	Ind.	Mich.	Ohio	Penn.	N.Y.
Not Important				●				
Not Sure		●						
Could be a Good Idea								
In Theory a Good Idea, But Expensive					●	●	●	●
Very Important, If Federal Funds Are Provided	●		●					

Status of Acquisition Programs

Assessment	Minn.	Wisc.	Ill.	Ind.	Mich.	Ohio	Penn.	N.Y.
No Authority Available								
Authority Available for Other Purposes	●	●	●	●	●	●	●	●
Authority Available to Acquire Erosion & Flood Prone Land								
Modest Program Underway								
Major Acquisition Underway			●					

Summary

- *Acquisition of vulnerable shorelands deserves careful study, since it is the only absolute means of control over development and use of shorelands. Recreational benefits are also possible.*

- *The major drawback is high cost.*

- *In most cases past aquisition programs have been utilized for aquiring lands with high recreation or other public use potential.*

- *Authority to acquire lands for special purposes exist, but few states have specific shoreland acquisition programs or authority to protect vulnerable shorelands. The program is not large because of lack of financial capability and specific legislative authority in most states.*

- *Federal agencies with grant programs could contribute to an acquisition effort.*

ALTERNATIVE #7: Insurance Against or Reimbursement From Other Sources for Damage from Erosion and Flooding

The objective of programs providing subsidized insurance or loans to property owners who have incurred losses due to national disasters is to ease the financial impact on the property owner. Insurance reimburses for loss but does not normally prevent the loss.

For flooding, under the National Flood Insurance Program (P.L. 90-448, as amended), insurance is subsidized, up to an amount specified, on properties in areas designated as hazardous by the Federal Insurance Administration. The land use control measures required of communities to gain and maintain eligibility for flood insurance is complementary to other flood plain management efforts. The Corps of Engineers has made analyses of flood plain hazards for the Flood Insurance program.

The applicability of the National Flood Insurance Program for damage of private property along a lake or other large body of water resulting from shoreland erosion is covered but application is made to each occurrence of loss by wave action on a case-by-case basis due to distinctions pertaining to the legal concept of sudden surge and that of gradual continuous erosion.

The Flood Disaster Protection Act of 1973 substantially increases the limits of coverage and total amount of insurance authorized under the National Flood Insurance Program and requires known flood-prone communities to participate in the program or face restrictions in the availability of Federal loans, grants and other forms of financial assistance. The Act provides for the expeditious identification and dissemination of information concerning flood-prone areas which will have a direct impact on the direction and timing of Federal flood-risk zone mapping activities. The Federal agencies involved in the identification and delineation of flood-risk zones have been directed to to give the highest practicable priority in the allocation of available manpower and other available resources to the identification and mapping of flood hazard areas and flood-risk zones, in order to assist in meeting the notification deadlines established by the Act.

Additionally, the Act specifically provides for protection against damage and loss resulting from the collapse or subsidence of land along the shore of a lake or other body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels.

The Small Business Administration has the authority to provide disaster relief under the Provisions of the Disaster Relief Act Amendments of 1973 (p.l. 93-24). The Act provides for loans requested and made in disaster areas declared by the SBA for both home and business.

The purpose of the loans is for the repair, rehabilitation, or replacement of property damage or destroyed, without regard to whether the required financial assistance is available from private sources.

Unlike gradual erosion, damage due to flooding has been eligible for disaster assistance. There have recently been seven disaster declarations in states bordering on the Great Lakes. These declarations resulted in approximately 14,300 loans totaling $52 million to assist the victims.

A degree of indirect reimbursement of losses due to flooding and shoreland erosion to property owners is theoretically possible through the provision of property tax relief. Proposals to encourage the preservation of land in a natural state through tax relief suggest a reduction in taxes to compensate for a reduction in land value and often include provisions which require a decision to make the land unavailable for development. Authorization would be required on the state and local levels for implementation of tax relief measures. The development of information on the effectiveness of current and proposed management approaches, such as those growing out of state programs under the Coast Zone Management Act of 1972, will be a necessary prerequisite for an effective strategy in this regard.

Assessment of presently available programs involving insurance and/or reimbursement is presented below.

Assessment of Available Programs

Assessment	Minn.	Wisc.	Ill.	Ind.	Mich.	Ohio	Penn.	N.Y.
No State Program Available	●	●	●	●	●	●	●	●
Positive Tax Relief								
State Program Available								
Support National Flood Insurance	●	●	●	●	●	●	●	●
SBA Program		●			●	●		●

- *Summary*

  - *The use of the NFI and SBA programs is appropriate for mitigating flood losses. Coverage under the National Flood Insurance Program has recently been increased and extended to damages resulting from erosion by waves in lakes exceeding anticipated cyclical levels.*

  - *Under the Flood Disaster Protection Act of 1973, Federal flood-risk zone identification and mapping agencies have been directed to give highest priority to identifying flood-prone areas.*

  - *The States have placed high priority on the National Flood Insurance Program and have encouraged local government to participate.*

  - *The States do not have their own programs equivalent to the Federal programs. In general, they have depended upon the Federal programs.*

  - *The States have not provided positive tax relief to mitigate erosion damages.*

A STRATEGY FOR SHORELAND DAMAGE REDUCTION

The foregoing discussions and assessments of the seven erosion and flood damage reduction alternatives provide a basis for the identification of several planning "knowns" which will influence the development and implementation of a Strategy for Shoreland Damage Reduction:

- No single alternative will, but bring about a major reduction in losses from erosion and flooding out the potential exists to bring about a major reduction over time through a strategy which combines all available alternatives.

- It appears that Federal, State and local agencies have authority and programs to assist in planning and implementing many of the alternatives.

- Extensive public funding support is not available for protection of privately owned property.

- Future losses should be controlled by non-structural land use controls whenever possible and structural means should be employed only as supplemental management efforts when needed to adequately protect vulnerable lands from excessive erosion and flooding.

- In most instances permanent structural control measures cannot be justified economically for protection of extensive reaches of shoreline, especially as short-term solutions.

Action programs which can be implemented should be evaluated by the participating Federal, state and local decision makers in light of the following criteria:

- *Is the action consistent with the type of shoreland desired in the long-term?*

  Value-scale expressions indicate that the long-range goal of the states is that the shorelands should be impacted to the minimum possible degree so as to protect and preserve shoreland integrity and uniqueness. Economic and social value of the shorelands for a wide variety of uses is recognized.

- *Are the effects of the action predictable in terms of achieving the objectives?*

  The proposed actions should be assessed in terms of results which are realizable. For example, achievement of future shoreland damage reduction through the application of zoning at the local level will require that local decision-makers and interest groups be convinced of the efficacy of such actions.

- *Is the action desired by all parties?*

  The strategy should be applicable to all regions in a manner which allows for adoption by all of the states. This implies a mix of alternative actions from which a program applicable to special problems can be developed.

The Strategy can be viewed as a process of decision-making taking place in two phases:

- early action program
- sustained action program

The early action program could be implemented through application of existing authorities and programs with some modifications in emphasis. The early action program would be oriented more towards actions of a curative nature and would emphasize applied engineering measures, expanded technical assistance from the state and Federal agencies, and intensification of programs for data collection.

The sustained action program involves a concerted effort by the participating jurisdictions in the long-term. This program would emphasize actions of a preventive nature in which decisions affecting the future land uses of the shoreland zone will be made in recognition of the erosion and flooding dangers.

Activities of the Strategy, for both the early action and sustained action phases, can be classified into three categories:

- planning activities
- engineering activities
- management activities

Generally speaking, the planning activities consist of those required for developing an organizational framework to achieve better communications and closer cooperation among Federal, state, and local authorities. A formal joint FRC-GLBC Task Force has been formed as an initial step in this regard. Achievement of an effective organizational structure is a necessary prerequisite for the decision-making required for development and implementation of the appropriate engineering and management techniques designed to reduce shoreline damage. The Task Force is directing its efforts towards generating information needed for this decision making.

The categories of activities can be represented schematically.

The need for adequate data upon which informed judgment can be made cannot be overemphasized. In view of the constitutional and statutory limits governing the regulations of private property, it is essential that regulations be based on sound technical information. For example, structural setback requirements can be determined by a formula using average annual erosion rates and the economic life of structures, plus a reasonable safety factor. Information on current and long-term erosion rates and the relative role of man-made and natural causative factors on these erosion rates is required for most of the alternatives whether they be of an engineering or management nature. In some respects, it will be necessary to have data on every mile of problem shoreline so that the effectiveness of the various alternatives can be evaluated. The development of the data base should be accomplished on a coordinated basis.

The strategy,as developed to date, encompasses:

- Planning Activities

  - Initial Planning
    -- A conference of governors and senior Federal officials to consider the concept for Strategy development and implementation.
    -- A series of workshops and review meetings to amplify and refine the Strategy with particular attention to definition of alternative courses of action; roles of Federal, state, and local governments; requirements for additional knowledge and data; and priorities and resources for action programs.

  - Early Action
    -- Inventory of shoreland damage and assessment or protective measures
    -- Efforts to obtain authority at each level of government consistent with roles agreed upon in Strategy development.

  - Sustained Action
    -- Continual updating of the Strategy to insure an optimum mix of programs for reducing shoreland damage. This will require continued comprehensive analysis of technical, economic, environmental, and social factors.
    -- Expanding the base of technical knowledge and specific data for use by officials who have responsibility for deciding upon the Strategy and upon specific programs to carry it out.

- Engineering Activities

  - Early Action
    -- Continuation of extraordinary regulation procedures for Lake Superior and Lake Ontario to provide maximum relief from critical high water levels without causing undue detriment to Lake Superior or the St.Lawrence River interests.
    -- Completion of emergency flood protection with assistance under Public Law 99.
    -- Accelerated execution of authorized Federal shoreland protection projects.
    -- Pilot projects to use spoil from maintenance dredging from shoreland protection.
    -- Further protective measures by state and local governments with appropriate Federal support.
    -- Expanded efforts by private owners to provide erosion protection with technical assistance from Federal, state, and local governments.

  - Sustained Action
    -- Completion of international studies on further lake regulations, a joint decision by the United States and Canada on whether to proceed with any proposed project, and construction of any regulatory works which may be authorized pursuant to such a decision.

-- Study, recommendation, authorization, and execution of permanent shoreland protection projects eligible for Federal participation under Public Laws 166 (1945), 826 (1956), and 87-874.
-- Mitigation of damages from Federal navigation projects under Section III, Public Law 90-483.
-- Continued provision of protection against eosion and flooding by private owners with technical assistance from Federal, state and local governments.

- Land Use Control Activities

- Early Action
-- Increased efforts in identification and mapping of flood hazard areas and flood-risk zones.
-- Expansion of disaster insurance coverage under the Flood Disaster Protection Act of 1973.

__ Development of generalized criteria and standards applicable to shoreland controls in all states subject to detailed shoreland land use controls which might apply to specific states according to legislative enactments and the particular existing shoreland character and development of the various states.

-- Development of general criteria and standards for regulating construction which may aggravate erosion and flooding subject to detailed regulatory controls which exist or might be enacted by the various states.

-- Identification by Federal, State and local governments of those shoreland areas which should be protected through state and local programs for acquisition and relocation.

- Sustained Action
-- Enactment and execution of state programs for shoreland management, with Federal assistance under the Coastal Zone Management Act of 1972.
-- Enactment and execution of state and local programs for acquisition and relocation of development from vulnerable shorelands.
-- Regulation of construction in navigable waters to prevent new structures and progressively modify or eliminate existing structures which tend to aggravate erosion and flooding.

MANAGEMENT AND IMPLEMENTATION OF EARLY AND SUSTAINED ACTION PROGRAMS

The FRC-GLBC Shoreland Damage Reduction Task Force has been formed to coordinate the work effort. This intergovernmental organization consists of members of the following jurisdictions:

Great Lakes States	Federal Officials
Minnesota	Department of Agriculture
Wisconsin	Department of Commerce
Illinois	Department of Defense
Indiana	Department of Interior
Michigan	Department of Housing & Urban Development
Ohio	Department of Transportation
Pennsylvania	Environmental Protection Agency
New York	Small Business Administration

The function of the Task Force is to fit together and monitor programs directed at defining a near optimum mix of strategy alternatives for major reaches of the Great Lakes shoreline.

Each participating agency, both Federal and state, is providing information which will allow for delineation of agency responsibilities, capabilities, priorities, potential program adjustments, and data and information needs necessary for implementation.

The development of work plans directed at carrying out the provisions of the Strategy will be required. The funding required to carry out the work element derived from the Strategy will be based primarily on existing programs during the Early Action Phase. Identification of priority shoreland damage reduction needs will provide a basis for increased funding or redirection of funding during the Sustained Action Phase. Priorities will be given to programs that are responsive to the urgency of public need, or where the need for demonstration is high, and when opportunities exist to have the work performed by the private sector with appropriate governmental technical assistance. The Federal and state governments should fund existing programs which provide incentives for local governmental participation in carrying out the Strategy.

Program accomplishment will be scheduled to address immediate and short-term problems and to lay the groundwork for developing an effective approach for dealing with the total problem in the Sustained Action program.

Planning activities currently being carried out through the efforts of members of the Joint FRC-GLBC Task Force have led to the development of a five-year action program to develop and demonstrate alternative methods of reducing shoreland damages on the Great Lakes.

Specific action activities which have been tentatively scheduled are presented in Figure 2 below. These activities are offered as a suggestion without commitment of agencies and states at this time. The work scheduled during the initial two years of the five-year action program, are directed toward the development of an information based upon which informed decisions can be made on a mix of alternatives for dealing with the major types of problems in a comprehensive manner. Additional action programs will be incorporated into the schedule as appropriate through continued planning activities by members of the FRC-GLBC Shoreland Damage Reduction Task Force.

FIGURE 2
IMPLEMENTATION OF THE STRATEGY
EARLY ACTION PHASE OF FIVE-YEAR PROGRAM